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EXAMINER	
HENN, TIMOTHY J	

ART UNIT	PAPER NUMBER
2612	7

DATE MAILED: 08/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/693,323	Applicant(s) RAO ET AL.	
	Examiner Timothy J Henn	Art Unit 2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-15 and 17-20* is/are rejected.

7)☒ Claim(s) *4 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 October 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Response to Arguments

2. Applicant's arguments, see amendment, filed June 27, 2004, with respect to claim 16 have been fully considered and are persuasive. The rejection of claim 16 has been withdrawn.

3. Applicant's arguments with respect to claim 1-15 and 17-20 have been considered but are moot in view of the new ground(s) of rejection.

In response to the applicants arguments about claims 8, 9 17 and 18 note including limitations regarding rolling shutters, partial frames or areas of interest the examiner notes that although the claims do not specifically call for these features, a system with these features such as Clark meets the claimed limitations of initiating a pixel readout at a certain position. Clark discloses a system which begins readout at a specified column/row position determined by an address which is equivalent to the "pixel series position" claimed.

In regard to claims 8 and 9 specifically it is noted that claim 8 includes functional (i.e. reducing noise) language which is met as long as the structural limitations are met (i.e. apparatus claims must be distinguished by their structure, not their function) see MPEP §2114. The examiner is uncertain how noise can be reduced simply by starting

readout at a different pixel series positions than in prior art systems, therefore claims 8 and 9 have been rejected under 35 USC §112 first paragraph.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 8 and 9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In regard to claims 8 and 9 the Applicant claims that by starting readout at a certain pixel position noise can be reduced and signal quality can be increased. It is unclear from the specification how one is able to reduce noise and increase signal quality by starting a readout sequence at a pixel series position as claimed in claims 8 and 9. The Examiner notes that Applicants merely disclose on page 13 lines 2-6 that "the line data generated by CMOS imaging sensor 106 does not include noise and other problems that have been observed in the prior art that prevents CMOS sensors from being used to generate image data for component inspection". Although this and the preceding lines provide antecedent basis for claims 8 and 9, they fail to meet the requirements of 35 U.S.C. §112, first paragraph.

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 1-3, 5, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canini et al. (US 6,512,218) in view of Clark et al. (US 6,515,701).

[claim 1]

In regard to claim 1, note that Canini discloses a system for inspecting components comprising: a CMOS imaging system generating image data (Figure 6, Item 5); an image analysis system coupled to the CMOS imaging device, the image analysis system receiving the image data and generating image analysis data (e.g. Figure 6, Items 6, 7, 10, 15, 16, 17 and 30; c. 3, l. 55 - c. 4, l. 2); and wherein the CMOS imaging system generates the image data at a rate that allows the CMOS imaging device to be used for inspecting components (The office notes that the imaging system of Canini is inherently run at a rate which allows component inspection) in response to control data received from the image analysis system (c. 3, ll. 59-65). Therefore, it can be seen that Canini does not disclose the use of line shift control data.

Clark discloses an image sensor readout system using line shift control data to sequentially readout a plurality of rows (e.g. c. 6, l. 45 - c. 8, l. 8) which enables simple adjustment of the exposure time of the image sensor (c. 7, ll. 56-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use line shift control data as taught by Clark to control the exposure of the

image sensor of Canini to enable simple adjustment of exposure time.

[claim 2]

In regard to claim 2, note that Canini discloses a CMOS imaging system comprising a CMOS active pixel sensor (Figure 6, Item 5; c. 1, ll. 43-64).

[claim 3]

In regard to claim 3, it can be seen that the combination of Canini in view of Clark lacks an CMOS imaging sensor which is a Photobit model PB1024 CMOS active pixel sensor. However, no criticality is given for the specific use of the model PB1024 CMOS active pixel sensor, therefore It would have been obvious to one of ordinary skill in the art at the time the invention was made to use any image sensor which meets the minimum specifications required for inspecting components (Official Notice).

[claim 5]

In regard to claim 5, note that the CMOS imaging system of Canini further comprises an image analysis controller receiving pixel data from a sensor and generating the image data from the pixel data (Figure 6, Item 15; c. 5, ll. 52-63).

[claim 8]

In regard to claim 8, note that Clark teaches a readout system or "pixel shift system" which starts readout at a predetermined position and that can be used for reading out partial frames or specific areas of interest within the image sensor area (c. 6, l. 45 – c. 8, l. 8; Clark defines the readout position using start and end addresses). The office notes that claim 8 is written using intended use language (i.e. "enables a readout sequence to start at a pixel position"). The examiner notes that the system of

Clark enables a readout sequence to begin at any pixel position on the imaging array. Therefore, Clark discloses the claimed "pixel shift system".

[claim 9]

In regard to claim 9, since the system of Clark can begin readout at any pixel position, it can inherently begin readout at a fifth pixel series position.

8. Claims 6, 7, 13-15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canini et al. (US 6,512,218) in view of Clark et al. (US 6,515,701) in further view of Krymski et al. ("A High Speed, 500 Frames/s, 1024 x 1024 CMOS Active Pixel Sensor").

[claim 6]

In regard to claim 6, note that Canini in view of Clark lacks a system wherein a line of image data is generated at a speed greater than one line every 15.6 microseconds.

Krymski teaches a CMOS image sensor operable at fast frame rates which "achieves an extremely high output data rate of over 500 Mbytes per second and a low power dissipation". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the sensor of Krymski in the system of Canini in view of Clark to achieve a system with fast imaging rates with low power dissipation. The office notes that if the sensor is capable of generating 500 frames every second, then 1 frame will be generated in 2 milliseconds. Considering the fact that there are 1024 lines in the sensor and a frame is generated every 2 milliseconds,

the sensor will generate a single line every 2 mS/1024 lines or 1.95 μs / line. This is well under the claimed limit of 15.6 μs / line rate.

[claim 7]

In regard to claim 7, note that Canini in view of Clark lacks a system wherein a frame of image data is generated at a speed greater than one frame every 30 milliseconds.

Krymski teaches a CMOS image sensor operable at fast frame rates which "achieves an extremely high output data rate of over 500 Mbytes per second and a low power dissipation". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the sensor of Krymski in the system of Canini in view of Clark to achieve a system with fast imaging rates with low power dissipation. The office notes that the sensor of Krymski achieves a rate of 500 frames/s or one frame per 2 milliseconds.

[claim 13]

In regard to claim 13, note that Canini discloses a method for generating image data of a component for use in inspecting the component comprising: generating pixel data using a CMOS imaging system (Figure 6, Item 5; c. 3, ll. 20-29); transferring the pixel data and assembling the pixel data into a frame (c. 5, ll. 52-63). Therefore it can be seen that Canini lacks a method in which the pixel data is outputted or "transported" as a plurality of pixel lines.

Clark discloses an image sensor readout method using line shift control data to sequentially readout a plurality of rows or "pixel lines" (e.g. c. 6, l. 45 - c. 8, l. 8) which

enables simple adjustment of the exposure time of the image sensor (c. 7, ll. 56-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use line shift control data method as taught by Clark to control the exposure of the image sensor of Canini to enable simple adjustment of exposure time. It can further be seen that Canini in view of Clark lacks a method for generating image data wherein the frame is assembled in less than 30 milliseconds.

Krymski teaches a CMOS image sensor operable at fast frame rates which "achieves an extremely high output data rate of over 500 Mbytes per second and a low power dissipation". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the sensor of Krymski in the system of Canini in view of Clark to achieve a system with fast imaging rates with low power dissipation. The office notes that the sensor of Krymski achieves a rate of 500 frames/s or one frame per 2 milliseconds.

[claim 14]

In regard to claim 14, note that Canini discloses a CMOS imaging system comprising a CMOS active pixel sensor (Figure 6, Item 5; c. 1, ll. 43-64).

[claim 15]

In regard to claim 15, it can be seen that the combination of Canini in view of Clark lacks an CMOS imaging sensor which is a Photobit model PB1024 CMOS active pixel sensor. However, no criticality is given for the specific use of the model PB1024 CMOS active pixel sensor, therefore Official Notice is taken that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use any

image sensor which meets the minimum specifications required for inspecting components.

[claim 17]

In regard to claim 17, note that Clark teaches a readout system or "pixel shift system" which starts readout at a predetermined position and that can be used for reading out partial frames or specific areas of interest within the image sensor area (c. 6, l. 45 – c. 8, l. 8; Clark defines the readout position using start and end addresses). The examiner notes that the system of Clark enables a readout sequence to begin at any pixel position on the imaging array. Therefore, Clark discloses the claimed "pixel shift system".

[claim 18]

In regard to claim 18, since the system of Clark can begin readout at any pixel position, it can inherently begin readout at a fourth pixel series position.

[claim 19]

In regard to claim 19, note that Clark discloses a readout process which takes place after the completion of a reset process for a predetermined number of lines (e.g. c. 7, ll. 10-16). The Examiner notes that if the reset of the last row (i.e. row N+M) is considered to be the "reset command" claimed, a frame readout (i.e. readout of the addressed pixels, rows N through N+M) will inherently follow under the system of Clark (see c. 6, l. 45 - c. 8, l. 8).

[claim 20]

In regard to claim 20, note that the image sensor of Krymski et al. can output a frame at different frame rates, from 15 f/s (66 ms/f) to 574 f/s (1.7 ms/f). Therefore it can clearly be seen that the system of Canini in view of Clark in further view of Krymski would be capable of assembling a frame in the claimed 13.5 milliseconds. Official Notice is given that It would have been obvious to one of ordinary skill in the art at the time the invention was made to generate a frame every 13.5 milliseconds if required by the component inspection system of Canini to achieve the desired results of component inspection.

9. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canini et al. (US 6,512,218) in view of Krymski et al. ("A High Speed, 500 Frames/s, 1024 x 1024 CMOS Active Pixel Sensor").

[claim 10]

In regard to claim 10, note that Canini discloses a CMOS imaging system comprising: a CMOS active pixel sensor generating pixel data (Figure 6, Item 5; c. 1, ll. 43-64); and a controller coupled to the CMOS active pixel sensor, the controller receiving the pixel data and generate pixel line data (Figure 6, Items 30, 10 and 15; c. 3, ll. 40-66; c.5, ll. 52-63; The office notes that to generate a frame the controller must inherently generate pixel line data). Therefore it can be seen that Canini lacks a CMOS imaging system which generates pixel line data at a rate greater than one line every 15 microseconds.

Krymski teaches a CMOS image sensor operable at fast frame rates which "achieves an extremely high output data rate of over 500 Mbytes per second and a low power dissipation". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the sensor of Krymski in the system of Canini in view of Clark to achieve a system with fast imaging rates with low power dissipation. The office notes that if the sensor is capable of generating 500 frames every second, then 1 frame will be generated in 2 milliseconds. Considering the fact that there are 1024 lines in the sensor and a frame is generated every 2 milliseconds, the sensor will generate a single line every 2 mS/1024 lines or 1.95 μs / line. This is well under the claimed limit of 15 μs / line rate.

[claim 11]

In regard to claim 11, note that Canini discloses a controller which can select specific windows of pixels to be readout (c. 7, l. 32 - c. 8, l. 67). It is noted that by reading out only a subset of the array in a "window" mode, the pixel readout will inherently be initiated at a pixel series position.

[claim 12]

In regard to claim 12 note that Canini in view of Krymski et al. discloses a high-speed CMOS imaging system wherein the controller further comprises a framing system generating frames of image data at a rate greater than one frame every 30 milliseconds (The office notes that a frame generating speed of 500 frames/s is equivalent to generating a frame every 2 milliseconds.

Allowable Subject Matter

10. Claims 4 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

[claim 4]

In regard to claim 4, the prior art does not teach or fairly suggest a processor coupled to the image analysis system of claim 1 where the processor operates one or more additional software systems used for image analysis, wherein the processor, the image analysis system and the CMOS imaging system are an embedded imaging system.

[claim 16]

In regard to claim 16, the prior art does not teach or fairly suggest a method of claim 13 further comprising generating a reset command; initiating a pixel line at the next clock cycle after the reset command; waiting a predetermined number of clock cycles to generate a next pixel line; wherein the predetermined number of clock cycles is less than 208 clock cycles.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J Henn whose telephone number is (703) 305-8327. The examiner can normally be reached on M-F 7:30 AM - 5:00 PM, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy R Garber can be reached on (703) 305-4929. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TJH
8/20/2004

NGOC-YEN VU
PRIMARY EXAMINER